

accumulators. The tendency to form these brushes may be much diminished by cementing a small disk of sheet caoutchouc over the inner ends of each metal-inducing strap.

The machine in full work presents several points of interest, the explanation of which, perhaps, is not very obvious. The first I would notice is, that although 15-inch plates will scarcely give an *unassisted* spark of more than 1½ inches in length, the interposition of a trifling condenser, showing only a coated surface of 6 square inches, will entirely change the character of this spark, the almost continuous stream of short sparks giving place to fewer, zigzag, snapping, 4-inch discharges, of much increased density and brilliance. The attachment of a condensing tube, constructed as follows, will be found a valuable addition to such machines as collect separately the positive and negative electricities.

About 18 inches of thin glass combustion-tubing of ¾-inch diameter is taken. Within, and at 4 inches distance from each end, a space of 2 inches is coated with tinfoil, leaving a space of 5 inches or so of clear glass between them. Two similar pieces of foil are fixed by a thin coat of gold-size on the exterior of this tube. They superpose the inner pieces of foil, and act as the outer coats of two small Leyden jars united as it were in one. These outer coatings are connected by a strip of tinfoil. The inner coats are placed in contact respectively with the plus and minus collectors of the machine, by means of thick brass wires thrust through caoutchouc plugs. The wires are so bent that their ends may drop into suitable holes, from which they may be at any time detached.

A thin coat of spirit lac-varnish spread within and without much favours the insulation of the tube.

Thus arranged, bright angular sparks of 4 or more inches in length will pass between the knobs of the discharger at every three-quarter turns of the handle.

Another point of interest offers itself when the knobs of the discharger are placed beyond their usual striking distance. In such a case the spark very frequently passes within the tube from coating to coating, quite silently, and with an optical illusion of comparative slowness of transit. When first I noticed these bright flashes of light, they suggested the form of an undulating fire-ball, and this brought to my remembrance the often-described but obscure phenomenon of "ball-lightning." I could not, however, detect any real retardation of the discharge by a somewhat rough experiment with the ordinary spark-wheel.

When two large jars are connected with the machine the disruptive discharge of 4 inches is accompanied by a sharp report, like that of a small pistol. I was not prepared for the fact that such a noisy discharge made to pass through the condensing-tube is quite silent, just as if it flashed through a partial vacuum. It may also be noted that the spark through the tube may be made much to exceed the length of the discharge in the ordinary way.

The last point I now mention, and concerning which I should value the remarks of Mr. Wimshurst, or any other competent electrician, is the increasing intensity of charge taken up by the metal inducers, or sectors, as they pass each other between the point of their contact with the earth through the metallic brush and the next following comb-collector. In the electrophorus such a contact is required once between the delivery of each spark; whereas in the machine here used, having perhaps twenty-eight sectors, a contact is given only once in seven inductive processes.

It will be found that well-varnished jars, without the usual wooden tops, are much the most efficient. Nevertheless, even these sometimes become so highly charged, that the electricity will force itself over their edges, doubling back, as it were, over a distance of 5 inches.

A pretty, but somewhat trifling experiment may be made by attaching two jars of unequal capacities to the collectors. Thus a jar of half a pint capacity placed on one side may be flanked by a quart jar on the other. Here the small jar, if the coatings be not too distant from the lip, will discharge itself three different times, whilst the large jar is getting sufficient tension to strike, say, at 3½ inches. Both jars will then discharge together across the upper knobs. It may thus be shown that four half-pints of electricity make one quart of the same, as in liquid measure.

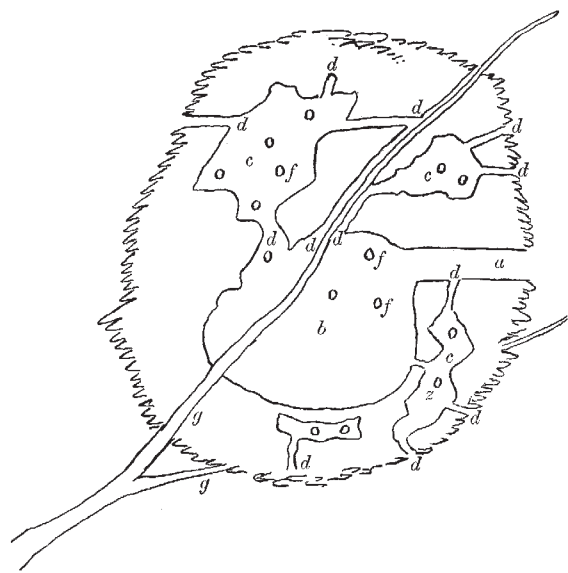
G. B. BUCKTON

#### Nesting of *Micropternus Phaeocephus*

IN continuation of the communication from my friend, Mr. Wm. Davison, regarding the nesting of woodpeckers in ants' nests, published in NATURE (vol. xxi. p. 438), perhaps the following notes of mine may be of interest:—

Camp Meplay, Thoun-yeen Valley, Tenasserim,  
April 20, 1882

This morning, in going from my camp to the Meplay Forest Reserve, I had to pass through several densely overgrown phonzohs.<sup>1</sup> While making my way along with some difficulty, I startled a brown woodpecker (*Micropternus phaeocephus*) from a small pyngado tree (*Xylocopa dolabriformis*). Looking up into the branches I saw a large ants' nest, in the centre of which appeared a circular hole so exactly like the borings made by woodpeckers ordinarily in the trunks of trees, that I sent up a Karen boy who was with me to ascertain whether it was possible the *Micropternus* had been boring into the ants' nest, as, I had heard was the bird's curious habit. The ants' nest was only about ten feet above the ground, placed in a fork of the pyngado, two small branches of which passed clean through it. Climbing up, putting in his fingers and then a twig, my Karen follower announced that there were two eggs. Leaving the nest alone for the time being, in the evening I returned by the same route, and was able not only to cut off and carry into camp the whole nest as it was; but I managed to secure also the hen bird as she flew from the eggs. Arrived in camp, I got the two eggs out, and then very carefully made a cross-section through the



a, entrance tunnel made by woodpecker; b, retort-shaped nesting-chamber of woodpecker; c, excavations made by the ants; d, d, d, entrances to them; f, f, f, tunnels made by the ants; g, g, fork of pyngado branch—one twig passing through the egg-chamber excavated by the woodpecker.

ants' nest so as to divide the boring made by the woodpecker longitudinally.

The accompanying is a rough diagrammatic sketch of the appearance of the cross-section of the nest as hollowed out by the woodpeckers. The ants' nest was a large, spherical, solid mass of leaves and clay, the leaves outside being arranged one over the other something like the tiles on the roof of a house, but riddled in many places with the entrance tunnels made by the ants—a small black and red species of *Myrmica*, the trivial or specific name of which I do not know. It is probably closely allied to the *Myrmica* mentioned by Sir J. Lubbock in his "Ants, Bees, Wasps" as having been described by Sykes in the *Trans. Ent. Soc.*, vol. i. Very few of the ants

<sup>1</sup> The wild hill-tribes of Burmah and Tenasserim have a wasteful system of cultivation called "toun-yeen." Yearly, in February, the heads of families in a village choose, each head for himself, a spot of well-grown, often virgin forest, generally on a hill-side, and within as convenient a distance of the village as is obtainable, cut down all the trees big and small, and allow them to rot during the hot months of March, April, and May, and towards the latter end of the last month set fire to them. The ashes thus obtained from the timber forms a splendid manure for paddy, and *toun-yeen* rice is preferred by the Karens to ordinary *quin* (field) rice. The "toun-yeen," or clearing after the paddy has been gathered in, is abandoned, and in two or three months, under a hot sun and excessive moisture, becomes an inaccessible jungle, full of thorny bamboos, creepers, and elephant grass. Such deserted *toun-yeen*s are called *phonzohs*, and are not again cultivable for from ten to fifteen years.

remained in the nest, and the few that were about seemed agitated and stung virulently. Probably the mass of them had been driven off or eaten by the woodpeckers. The tunnel the latter had made was about two inches in diameter and four inches long, bored horizontally in, and ending in an irregular-shaped egg-chamber about ten and a half inches in cross diameter, but narrowed by the branch of pyingado which pierced the nest through and through, and crossed the egg-chamber diagonally. The bottom of this chamber alone was smooth, but there was no lining, and the two translucent white eggs of the woodpecker had rested on the bare boards, so to speak, of the ants' house. In the excavations *ccc* made by the ants themselves there were neither eggs, larvæ, nor pupæ; probably these all had been removed when the woodpeckers invaded the nest.

CHARLES BINGHAM,

Deputy Conservator of Forests, British Burmah  
Henzada, British Burmah, April 12

### Staminody of Petals

The cases of staminody of petals not being very frequent, it may be of interest to draw the attention of the readers of NATURE to such a modification as observed in *Fuchsia*.

The places of the four petals of the flower examined are occupied by four almost colourless filaments of an average length of three-fifths of an inch. Each of them bears on its top a nearly circular dark red lamina of three-tenths of an inch diameter. These laminae are so strongly vaulted as to have the shape of a segment of a globe, the hollow side being turned outward, the convex inward. At the base of the lamina, *i.e.* at the top of the filament, a short protuberance is seen, resembling in external shape the lower part of an anther. This anther occupies the concave side of the lamina and is consequently turned outward. Though the anther of one of the petals is only slightly developed, yet it may be admitted as a matter of fact that, instead of petals, this flower has produced four stamens, whose anthers bear a petaloid appendage. A microscopic examination, namely, showed not only the peculiar composition of the anther-wall, but also the presence of pollen-grains.

Of the stamens, properly so called, the outer whorl is present, but the inner one is only represented by two of the four. One of these two is inserted in the ordinary way, *viz.* at the base of the petal. The second, however, has grown together half way up with the petal's filament; there it has, in consequence of a spiral turning, arrived at the back side of the petal, whence it bends obliquely outward. By this union the impression is created of a stamen rising from the back of the (modified) petal, concealing its anther in the lamina's concavity. This occurrence brings to recollection the case of *Monarda fistulosa* as cited by Maxwell T. Masters from Turpin ("Vegetable Teratology," p. 208), with this difference, however, that what is probably only adhesion is mistaken for petalody, whilst the case above described offers an antheroid petal grown together with a true stamen.

J. C. COSTERUS

Amsterdam, May 4

### Catalogue of Fossil Mammalia in the British Museum, Part I.

IN the review of the above work in a late number of NATURE (vol. xxxi. p. 597) the reviewer entertains such a complete misapprehension of my system of naming the premolar teeth of typical heterodont Eutherian mammals that I must beg space to correct it.

The reviewer asserts that this system is untrue because it implies that in general with a smaller number than the full complement of four premolars the diminution must have commenced with the first, proceeded with the second, and so on. In reality it implies nothing of the kind, and if he had taken the trouble to turn to pp. 152 (No. 39,732) and 174 (No. 48,787) he would have seen instances where I have mentioned the absence of the middle teeth (*pm.2* and *pm.3*) and the retention of the terminal teeth (*pm.1* and *pm.4*). Similarly in the "Palæontology of India," ser. 10, vol. iii. p. 48, I have adopted the same system for the incisors, and have shown that in *Hippopotamus* it is *i.2*, and not *i.3*, that disappears in some species.

I am well aware that in many of the Insectivora and Chiroptera there is often great difficulty in deciding on the homology of the individual premolars when these are reduced in number; and the reviewer might have noticed that in the former

order I have not ventured to definitely determine the position of any tooth in advance of the last premolar. Among the Chiroptera I have considered the three premolars of *Vespertilio* (p. 13) as homologous with the last three of the typical series, as there is apparently no evidence to the contrary; the small size of *pm.3* indicates, however, that an allied genus may retain only *pm.2* and *pm.4*; but the minute size of the one tooth in advance of *pm.4* in *Rhinolophus* has induced me to regard it as *pm.3*, although it may be *pm.2*.

The advantage of the system employed in the "Catalogue" is well instanced when we contrast the premolar dentition of *Canis*, and *Lepus* or *Theridomys*; the homology of the last tooth of this series (and there is only one in *Theridomys*) being at once seen, whereas it is entirely lost if we employ a method like that used in Dr. Dobson's "Catalogue of Chiroptera," where the actual first tooth in each genus is called the first of the series. I claim for the system adopted by myself every advantage in those cases where it is possible to determine the homology of the individual premolars in any form in which the number does not exceed four; and even in cases where such determination is not absolutely certain, the error can be but very slight, and does not lead to the utter confusion caused by the system (or, rather, the want of system) which I presume the reviewer would prefer.

When we come to those mammals in which the number of premolars is more than four, my system fails; and, in view of this, some German writers have adopted the plan of numbering the premolars the reverse way—*i.e.* terming the premolar next the first molar *pm.1*, and then counting towards the incisors. Although this system would be advantageous if we could always be sure of the division between the premolars and molars in homœodont mammals; yet it has several disadvantages, and has not, therefore, been adopted.

In reference to the suggestion of your reviewer, that instead of making a catalogue of the fossil Mammalia in the collection of the British Museum (as I was instructed to do by the Museum Authorities), I should have made one of all the known species of fossil Mammalia, any person having the slightest pretence to any knowledge of the present state of mammalian palæontology would have at once known that it would be utterly useless to attempt any such work at the present time, when new species and genera are being made almost daily, and a host of those already made are as yet but empty names.

As a minor matter, I may mention in regard to the lower jaws of *Crossopus*, alluded to in the review, that their identification rests solely on the authority of Prof. Sir R. Owen, and that perhaps I have acted in a too conservative spirit in admitting them.

Harpenden Lodge, May 2

RICHARD LYDEKKER

### Fossil Insects

"THE Earliest Winged Insects of America; a Re-examination of the Devonian Insects of New Brunswick in the Light of Criticisms and of New Studies of other Palæozoic Types," is the title of a *brochure* by Mr. S. H. Scudder, of Cambridge, Mass., recently published.

These Devonian insects are fragments of five wings; a sixth is now dropped, as "too imperfect for any satisfactory discussion," though in 1881 its description filled about two quarto pages. These insects have been, since 1865, so often discussed that their literature is a rather voluminous one. A number of far-reaching conclusions elaborated by the author would have to be abandoned if the determination of the insects should be proved incorrect. This I endeavoured to do in *Bull. Mus. Comp. Zool.*, viii. No. 14, Cambridge, 1881, and in NATURE, xxiii. p. 483. The principal aim of the author's new paper is to show that my determinations are erroneous. Concerning his statement that I have studied in nature only the (in most cases poorer) reverses, I may remark that his paper gives nothing more, after his study of the obverses; even less for *Gerephemera*.

These Devonian insects have been decidedly unfortunate from the very outset. Eminent palæontologists denied their Devonian origin, and put them to the Carboniferous or to the "Ursa Stufe" of the sub-Carboniferous. One of the insects, *Xenoneura antiquorum*, said to possess a stridulating organ on the wing, caused an unusual sensation. Poetic palæontologists were delighted to be introduced by this insect to the sounds of the Devonian woods. Now these woods are silent again, except in some text-books. "It does not appear reasonable," said the author, "to maintain